

# Initialisation Serveur Blockchain privée

## I Installation d'Ethereum sur Ubuntu

```
root@ESME4: ~  
libcurl4-doc libidn11-dev libkrb5-dev libldap2-dev librtmp-dev libssh2-1-dev libssl-dev libjsonrpcpp-tools  
The following packages will be REMOVED:  
  libcurl4-gnutls-dev  
The following NEW packages will be installed:  
  libargtable2-0 libcurl4-openssl-dev libjsonrpcpp-client0 libjsonrpcpp-common0 libjsonrpcpp-dev libjsonrpcpp-server0 libjsonrpcpp-stu  
0 upgraded, 7 newly installed, 1 to remove and 8 not upgraded.  
Need to get 496 kB of archives.  
After this operation, 980 kB of additional disk space will be used.  
Get:1 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libargtable2-0 amd64 13-1 [13.6 kB]  
Get:2 http://mirrors.digitalocean.com/ubuntu bionic-updates/main amd64 libcurl4-openssl-dev amd64 7.58.0-2ubuntu3.21 [302 kB]  
Get:3 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libjsonrpcpp-common0 amd64 0.7.0-1build2 [24.5 kB]  
Get:4 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libjsonrpcpp-client0 amd64 0.7.0-1build2 [20.4 kB]  
Get:5 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libjsonrpcpp-server0 amd64 0.7.0-1build2 [21.1 kB]  
Get:6 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libjsonrpcpp-stub0 amd64 0.7.0-1build2 [27.1 kB]  
Get:7 http://mirrors.digitalocean.com/ubuntu bionic/universe amd64 libjsonrpcpp-dev amd64 0.7.0-1build2 [86.9 kB]  
Fetched 496 kB in 0s (3737 kB/s)  
(Reading database ... 119668 files and directories currently installed.)  
Removing libcurl4-gnutls-dev:amd64 (7.58.0-2ubuntu3.21) ...  
Selecting previously unselected package libargtable2-0.  
(Reading database ... 119644 files and directories currently installed.)  
Preparing to unpack .../0-libargtable2-0_13-1_amd64.deb ...  
Unpacking libargtable2-0 (13-1) ...  
Selecting previously unselected package libcurl4-openssl-dev:amd64.  
Preparing to unpack .../1-libcurl4-openssl-dev_7.58.0-2ubuntu3.21_amd64.deb ...  
Unpacking libcurl4-openssl-dev:amd64 (7.58.0-2ubuntu3.21) ...  
Selecting previously unselected package libjsonrpcpp-common0.  
Preparing to unpack .../2-libjsonrpcpp-common0_0.7.0-1build2_amd64.deb ...  
Unpacking libjsonrpcpp-common0 (0.7.0-1build2) ...  
Selecting previously unselected package libjsonrpcpp-client0.  
Preparing to unpack .../3-libjsonrpcpp-client0_0.7.0-1build2_amd64.deb ...  
Unpacking libjsonrpcpp-client0 (0.7.0-1build2) ...  
Selecting previously unselected package libjsonrpcpp-server0.  
Preparing to unpack .../4-libjsonrpcpp-server0_0.7.0-1build2_amd64.deb ...  
Unpacking libjsonrpcpp-server0 (0.7.0-1build2) ...  
Selecting previously unselected package libjsonrpcpp-stub0.  
Preparing to unpack .../5-libjsonrpcpp-stub0_0.7.0-1build2_amd64.deb ...  
Unpacking libjsonrpcpp-stub0 (0.7.0-1build2) ...  
Selecting previously unselected package libjsonrpcpp-dev.  
Preparing to unpack .../6-libjsonrpcpp-dev_0.7.0-1build2_amd64.deb ...  
Unpacking libjsonrpcpp-dev (0.7.0-1build2) ...  
Setting up libjsonrpcpp-common0 (0.7.0-1build2) ...  
Setting up libargtable2-0 (13-1) ...  
Setting up libjsonrpcpp-server0 (0.7.0-1build2) ...  
Setting up libjsonrpcpp-stub0 (0.7.0-1build2) ...  
Setting up libjsonrpcpp-client0 (0.7.0-1build2) ...  
Setting up libcurl4-openssl-dev:amd64 (7.58.0-2ubuntu3.21) ...  
Setting up libjsonrpcpp-dev (0.7.0-1build2) ...  
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...  
Processing triggers for libc-bin (2.27-3ubuntu1.6) ...  
root@ESME4:~#
```

## II. Création de comptes pour le réseau privé Ethereum

```
root@ESME4:~/private-ethereum# geth --datadir data account new  
INFO [11-04|09:51:57.136] Maximum peer count          ETH=50 LES=0 total=50  
INFO [11-04|09:51:57.136] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"  
Your new account is locked with a password. Please give a password. Do not forget this password.  
Password:  
Repeat password:  
  
Your new key was generated  
  
Public address of the key: 0xfA5a8b5860c5d458b7c8b4f483d714994efff39c  
Path of the secret key file: data/keystore/UTC--2022-11-04T09-52-30.635973796Z--fa5a8b5860c5d458b7c8b4f483d714994efff39c  
  
- You can share your public address with anyone. Others need it to interact with you.  
- You must NEVER share the secret key with anyone! The key controls access to your funds!  
- You must BACKUP your key file! Without the key, it's impossible to access account funds!  
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!  
  
root@ESME4:~/private-ethereum#
```

Le mot de passe choisi est « root ». Ce mot passe est générique afin de faciliter l'accès aux membres du groupe. Il est cependant facilement trouvable.

```

root@ESME4:~/private-ethereum# geth --datadir data account new
INFO [11-04|10:00:42.562] Maximum peer count          ETH=50 LES=0 total=50
INFO [11-04|10:00:42.562] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
Your new account is locked with a password. Please give a password. Do not forget this password.
Password:
Repeat password:

Your new key was generated

Public address of the key: 0x2af32DcB109605819415311EBdB01Af6ee1BEb31
Path of the secret key file: data/keystore/UTC--2022-11-04T10-00-51.999938825Z--2af32dcb109605819415311ebdb01af6ee1beb31

- You can share your public address with anyone. Others need it to interact with you.
- You must NEVER share the secret key with anyone! The key controls access to your funds!
- You must BACKUP your key file! Without the key, it's impossible to access account funds!
- You must REMEMBER your password! Without the password, it's impossible to decrypt the key!

root@ESME4:~/private-ethereum#

```

Création d'un deuxième compte générique avec le mot de passe « root1 »

Verification avec la ligne de commande : *geth --datadir data account list*

```

root@ESME4:~/private-ethereum# geth --datadir data account list
INFO [11-04|10:02:21.138] Maximum peer count          ETH=50 LES=0 total=50
INFO [11-04|10:02:21.139] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
WARN [11-04|10:02:21.143] Sanitizing cache to Go's GC limits provided=1024 updated=664
INFO [11-04|10:02:21.144] Set global gas cap          cap=50,000,000
Account #0: {fa5a8b5860c5d458b7c8b4f483d714994efff39c} keystore:///root/private-ethereum/data/keystore/UTC--2022-11-04T09-52-30.635973796Z--fa5a8b5860c5d458b7c8b4f483d714994efff39c
Account #1: {2af32dcb109605819415311ebdb01af6ee1beb31} keystore:///root/private-ethereum/data/keystore/UTC--2022-11-04T10-00-51.999938825Z--2af32dcb109605819415311ebdb01af6ee1beb31

```

### III. Creation du Genesis File uniquement sur le serveur fourni dans un premier temps!

```

{
  "config": {
    "chainId": 202204,
    "homesteadBlock": 0,
    "eip150Block": 0,
    "eip155Block": 0,
    "eip158Block": 0,
    "byzantiumBlock": 0,
    "constantinopleBlock": 0,
    "petersburgBlock": 0,
    "ethash": {}
  },
  "difficulty": "1",
  "gasLimit": "8000000",
  "alloc":{
    "fa5a8b5860c5d458b7c8b4f483d714994efff39c": { "balance": "300000" },
    "2af32dcb109605819415311ebdb01af6ee1beb31": {"balance": "300000"}
  }
}

```

Le chainId est « 202204 » car nous sommes le groupe 04

Les deux comptes ont été ajouté et crédité d'un certain montant d'ethreum

## Résultat de l'instanciation du genesis block.

```
root@ESME4:~/private-ethereum# geth init --datadir data genesis.json
INFO [11-04|10:34:57.313] Maximum peer count           ETH=50 LES=0 total=50
INFO [11-04|10:34:57.316] Smartcard socket not found, disabling err="stat /run/pcscd/pcscd.comm: no such file or directory"
WARN [11-04|10:34:57.333] Sanitizing cache to Go's GC limits provided=1024 updated=664
INFO [11-04|10:34:57.335] Set global gas cap           cap=50,000,000
INFO [11-04|10:34:57.338] Allocated cache and file handles database=/root/private-ethereum/data/geth/chaindata cache=16.00MiB handles=16
INFO [11-04|10:34:57.411] Opened ancient database       database=/root/private-ethereum/data/geth/chaindata/ancient/chain readonly=false
INFO [11-04|10:34:57.412] Writing custom genesis block
INFO [11-04|10:34:57.413] Persisted trie from memory database nodes=3 size=397.00B time="162.155µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livenessize=0.00B
INFO [11-04|10:34:57.414] Freezer shutting down
INFO [11-04|10:34:57.415] Successfully wrote genesis state database=chaindata hash=8b84e7..1f9cc9
INFO [11-04|10:34:57.415] Allocated cache and file handles database=/root/private-ethereum/data/geth/lightchaindata cache=16.00MiB handles=16
INFO [11-04|10:34:57.499] Opened ancient database       database=/root/private-ethereum/data/geth/lightchaindata/ancient/chain readonly=false
INFO [11-04|10:34:57.500] Writing custom genesis block
INFO [11-04|10:34:57.502] Persisted trie from memory database nodes=3 size=397.00B time="291.882µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livenessize=0.00B
INFO [11-04|10:34:57.503] Freezer shutting down
INFO [11-04|10:34:57.506] Successfully wrote genesis state database=lightchaindata hash=8b84e7..1f9cc9
root@ESME4:~/private-ethereum#
```

## IV. Configuration du Bootnode

L'adresse IP est bien défini localement sur le port 30301.

```
root@ESME4:~/private-ethereum# bootnode
Fatal: Use --nodekey or --nodekeyhex to specify a private key
root@ESME4:~/private-ethereum# bootnode --genkey=boot.key
root@ESME4:~/private-ethereum# bootnode --nodekey=boot.key
enode://2e72db1e1ec2ec8bac30ba409a9775e127077a2e6876642334d2743aa18d6be67d26d7b0523a81fa75000a2b2edd21555f7cf172fb016e13db920c21479ff640@127.0.0.1:0?discport=30301
Note: you're using cmd/bootnode, a developer tool.
We recommend using a regular node as bootstrap node for production deployments.
INFO [11-04|10:37:21.603] New local node record      seq=1,667,558,241,600 id=9f0e1d33f55e688b ip=<nil> udp=0 tcp=0
root@ESME4:~/private-ethereum#
```

Les deux adresses correspondent.

```
root@ESME4:~/private-ethereum# bootnode --nodekey=boot.key --writeaddress
2e72db1e1ec2ec8bac30ba409a9775e127077a2e6876642334d2743aa18d6be67d26d7b0523a81fa75000a2b2edd21555f7cf172fb016e13db920c21479ff640
root@ESME4:~/private-ethereum#
```

## V. Configurez votre Ethereum Private Blockchain et commencer à miner uniquement sur le serveur dans un premier temps.

```
INFO [11-04|11:00:52.412] Chain post-merge, sync via beacon client
INFO [11-04|11:00:52.413] Gasprice oracle is ignoring threshold set threshold=2
WARN [11-04|11:00:52.413] Error reading unclean shutdown markers error="leveldb: not found"
WARN [11-04|11:00:52.413] Engine API enabled           protocol=eth
INFO [11-04|11:00:52.414] Starting peer-to-peer node   instance=Geth/v1.10.26-stable-e5eb32ac/linux-amd64/gol.18.5
INFO [11-04|11:00:52.414] Resuming state snapshot generation root=ed7f897..0f0544 accounts=0 slots=0 storage=0.00B dangling=0 elapsed=2.442ms
INFO [11-04|11:00:52.451] Mapped network port         proto=udp export=30303 import=30303 interface=ExtIP(146.190.232.50)
INFO [11-04|11:00:52.452] New local node record       seq=1,667,559,652,451 id=1b079fd389e49180 ip=146.190.232.50 udp=30303 tcp=30303
INFO [11-04|11:00:52.454] IPC endpoint opened         url=/root/private-ethereum/private-ethereum/geth.ipc
INFO [11-04|11:00:52.455] Generated JWT secret        path=/root/private-ethereum/private-ethereum/geth/jwtsecret
INFO [11-04|11:00:52.456] WebSocket enabled           url=ws://127.0.0.1:8551
INFO [11-04|11:00:52.456] HTTP server started         endpoint=127.0.0.1:8551 auth=true prefix= cors=localhost vhosts=localhost
INFO [11-04|11:00:52.457] Transaction pool price threshold updated price=0
INFO [11-04|11:00:52.457] Updated mining threads      threads=0
INFO [11-04|11:00:52.457] Transaction pool price threshold updated price=1,000,000,000
INFO [11-04|11:00:52.481] Mapped network port         proto=tcp export=30303 import=30303 interface=ExtIP(146.190.232.50)
INFO [11-04|11:00:52.482] Started P2P networking      self=enode://56b33f4c22e742f534e458962da8ef828166498aaa5189f2641db32799e31e32d8d95963b749114f6eed7096cd23b5ebac7e09279a911
5f2d780974d4db065a38146.190.232.50:30303
INFO [11-04|11:00:52.502] Commit new sealing work     number=1 sealhash=fb2215..9f9fe9 uncles=0 txs=0 gas=0 fees=0 elapsed="292.118µs"
INFO [11-04|11:00:52.502] Commit new sealing work     number=1 sealhash=fb2215..9f9fe9 uncles=0 txs=0 gas=0 fees=0 elapsed="812.866µs"
INFO [11-04|11:00:52.634] Generated state snapshot    accounts=8893 slots=0 storage=409.64KiB dangling=0 elapsed=222.628ms
Welcome to the Geth JavaScript console!

instance: Geth/v1.10.26-stable-e5eb32ac/linux-amd64/gol.18.5
coinbase: 0xf5a8b5660c5d458b7c8b4f403d714094efff39c
at block: 0 (Thu Jan 01 1970 00:00:00 GMT+0000 (UTC))
  datadir: /root/private-ethereum/private-ethereum
  modules: admin:1.0 debug:1.0 engine:1.0 eth:1.0 ethash:1.0 miner:1.0 net:1.0 personal:1.0 rpc:1.0 txpool:1.0 web3:1.0

To exit, press ctrl-d or type exit
> WARN [11-04|11:00:54.917] Snapshot extension registration failed peer=7d4a846a err="peer connected on snap without compatible eth support"
INFO [11-04|11:01:02.487] Looking for peers           peercount=1 tried=178 static=0
>
>
>
> WARN [11-04|11:01:10.246] Snapshot extension registration failed peer=d5a6c885 err="peer connected on snap without compatible eth support"
> exit
WARN [11-04|11:01:12.193] HTTP server graceful shutdown timed out
INFO [11-04|11:01:12.194] HTTP server stopped        endpoint=127.0.0.1:8551
INFO [11-04|11:01:12.194] IPC endpoint closed         url=/root/private-ethereum/private-ethereum/geth.ipc
INFO [11-04|11:01:12.195] Ethereum protocol stopped
INFO [11-04|11:01:12.195] Transaction pool stopped
INFO [11-04|11:01:12.195] Writing snapshot state to disk root=ed7f897..0f0544
INFO [11-04|11:01:12.196] Persisted trie from memory database nodes=0 size=0.00B time="8.349µs" gcnodes=0 gcsz=0.00B gctime=0s livenodes=1 livenessize=0.00B
INFO [11-04|11:01:12.196] Writing clean trie cache to disk path=/root/private-ethereum/private-ethereum/geth/triecache threads=1
INFO [11-04|11:01:12.249] Persisted the clean trie cache path=/root/private-ethereum/private-ethereum/geth/triecache elapsed=52.780ms
INFO [11-04|11:01:12.249] Blockchain stopped
INFO [11-04|11:01:13.680] Looking for peers           peercount=0 tried=175 static=0
root@ESME4:~/private-ethereum#
```

La commande `eth.getBlock(0)` retourne le hash du block de g n se

[illegible]

Le minage est possible et commence au bout de quelques minutes

```
INFO [11-16|13:45:31.293] Successfully sealed new block
INFO [11-16|13:45:31.293] ⚡ mined potential block
INFO [11-16|13:45:31.293] Commit new sealing work
INFO [11-16|13:45:31.294] Commit new sealing work
WARN [11-16|13:45:33.270] Snapshot extension registration failed
INFO [11-16|13:45:36.585] Looking for peers
INFO [11-16|13:45:39.587] Generating DAG in progress
INFO [11-16|13:45:41.972] Successfully sealed new block
INFO [11-16|13:45:41.973] ⚡ mined potential block
INFO [11-16|13:45:41.974] Commit new sealing work
INFO [11-16|13:45:41.975] Commit new sealing work
INFO [11-16|13:45:46.585] Looking for peers
INFO [11-16|13:45:56.590] Looking for peers
INFO [11-16|13:45:58.831] Generating DAG in progress
INFO [11-16|13:46:06.628] Looking for peers
INFO [11-16|13:46:09.161] Successfully sealed new block
INFO [11-16|13:46:09.162] ⚡ block reached canonical chain
INFO [11-16|13:46:09.162] ⚡ mined potential block
INFO [11-16|13:46:09.163] Commit new sealing work
INFO [11-16|13:46:09.164] Commit new sealing work
INFO [11-16|13:46:14.574] Successfully sealed new block
INFO [11-16|13:46:14.575] ⚡ block reached canonical chain
INFO [11-16|13:46:14.575] ⚡ mined potential block
INFO [11-16|13:46:14.578] Commit new sealing work
INFO [11-16|13:46:14.578] Commit new sealing work
WARN [11-16|13:46:16.423] Snapshot extension registration failed
INFO [11-16|13:46:16.681] Looking for peers

number=6 sealhash=eebcfe..cc2b4a hash=f12f93..67dad6 elapsed=14.187s
number=6 hash=f12f93..67dad6
number=7 sealhash=bdd341..327044 uncles=0 txs=0 gas=0 fees=0 elapsed="163.25µs"
number=7 sealhash=bdd341..327044 uncles=0 txs=0 gas=0 fees=0 elapsed="395.933µs"
peer=10b3e4ff err="peer connected on snap without compatible eth support"
peercount=1 tried=75 static=0
epoch=1 percentage=3 elapsed=1m12.454s
number=7 sealhash=bdd341..327044 hash=6e99a6..7b3016 elapsed=10.679s
number=7 hash=6e99a6..7b3016
number=8 sealhash=16e9db..d97100 uncles=0 txs=0 gas=0 fees=0 elapsed="464.799µs"
number=8 sealhash=16e9db..d97100 uncles=0 txs=0 gas=0 fees=0 elapsed=1.454ms
peercount=2 tried=138 static=0
peercount=0 tried=190 static=0
epoch=1 percentage=4 elapsed=1m31.697s
peercount=0 tried=88 static=0
number=8 sealhash=16e9db..d97100 hash=940515..a0c130 elapsed=27.187s
number=1 hash=2dfdd1..0cfc0f
number=8 hash=940515..a0c130
number=9 sealhash=8d78d5..69fbf1 uncles=0 txs=0 gas=0 fees=0 elapsed="288.87µs"
number=9 sealhash=8d78d5..69fbf1 uncles=0 txs=0 gas=0 fees=0 elapsed=1.331ms
number=9 sealhash=8d78d5..69fbf1 hash=0e7f11..50e3aa elapsed=5.411s
number=2 hash=5a0681..db26ac
number=9 hash=0e7f11..50e3aa
number=10 sealhash=0f6132..b7f991 uncles=0 txs=0 gas=0 fees=0 elapsed="203.923µs"
number=10 sealhash=0f6132..b7f991 uncles=0 txs=0 gas=0 fees=0 elapsed="654.306µs"
peer=55d93f39 err="peer connected on snap without compatible eth support"
peercount=2 tried=132 static=0
```

Le premier block est miné provenant bien du block de g n se

[illegible]

L'adresse enode est la suivante :

```
root@ESME4:~/private-ethereum# bootnode --nodekey=boot.key --addr 146.190.232.50:30301
node://2e72db1e1ec2ec8bac30ba409a9775e127077a2e6876642334d2743aa18d6be67d26d7b0523a81fa75000a2b2edd21555f7cf172fb016e13db920c21479ff640@146.190.232.50:0?discport=30301
```

## VI. Démarrage des nœuds

Sur ce screen, nous pouvons observer que les nœuds ont été importés.

```
INFO [11-16]16:50:11.541] Looking for peers peercount=3 tried=172 static=0
INFO [11-16]16:50:13.582] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=15.727ms mgasps=0.000 number=41 hash=9b7db3..388cab dirty=12.81KiB
INFO [11-16]16:50:14.167] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=9.546ms mgasps=0.000 number=42 hash=3b9dbb..57b762 dirty=13.28KiB
WARN [11-16]16:50:17.178] Snapshot extension registration failed peer=ffc54465 err="peer connected on snap without compatible eth support"
INFO [11-16]16:50:21.650] Looking for peers peercount=2 tried=123 static=0
WARN [11-16]16:50:24.117] Snapshot extension registration failed peer=04dfa983 err="peer connected on snap without compatible eth support"
WARN [11-16]16:50:29.584] Snapshot extension registration failed peer=e0963484 err="peer connected on snap without compatible eth support"
WARN [11-16]16:50:30.329] Snapshot extension registration failed peer=el18b10a err="peer connected on snap without compatible eth support"
INFO [11-16]16:50:31.042] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=9.067ms mgasps=0.000 number=43 hash=06b952..1a4f7a dirty=13.75KiB
INFO [11-16]16:50:31.826] Looking for peers peercount=3 tried=202 static=0
INFO [11-16]16:50:38.999] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=8.643ms mgasps=0.000 number=44 hash=950a1e..1f577a dirty=14.23KiB
INFO [11-16]16:50:39.078] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=7.595ms mgasps=0.000 number=45 hash=1e4996..f51a0d dirty=14.70KiB
INFO [11-16]16:50:41.617] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=24.292ms mgasps=0.000 number=46 hash=f997a4..e64dff dirty=15.18KiB
INFO [11-16]16:50:41.840] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=11.794ms mgasps=0.000 number=47 hash=efa78d..d368d8 dirty=15.65KiB
INFO [11-16]16:50:41.876] Looking for peers peercount=4 tried=70 static=0
INFO [11-16]16:50:44.989] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=11.353ms mgasps=0.000 number=48 hash=8b6cbb..d6c471 dirty=16.13KiB
WARN [11-16]16:50:47.141] Snapshot extension registration failed peer=decabla9 err="peer connected on snap without compatible eth support"
INFO [11-16]16:50:51.879] Looking for peers peercount=2 tried=149 static=0
INFO [11-16]16:50:57.436] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=8.905ms mgasps=0.000 number=49 hash=34724d..829084 dirty=16.60KiB
INFO [11-16]16:51:01.586] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=9.889ms mgasps=0.000 number=50 hash=731c01..8183f8 dirty=17.08KiB
INFO [11-16]16:51:01.924] Looking for peers peercount=2 tried=184 static=0
INFO [11-16]16:51:03.503] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=26.981ms mgasps=0.000 number=51 hash=77973d..adcc4d dirty=17.55KiB
WARN [11-16]16:51:03.784] Snapshot extension registration failed peer=a4da81c9 err="peer connected on snap without compatible eth support"
WARN [11-16]16:51:07.402] Snapshot extension registration failed peer=10b3e4ff err="peer connected on snap without compatible eth support"
WARN [11-16]16:51:09.412] Snapshot extension registration failed peer=98998f1a err="peer connected on snap without compatible eth support"
INFO [11-16]16:51:10.862] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=11.086ms mgasps=0.000 number=52 hash=e9c7e3..249e47 dirty=18.03KiB
INFO [11-16]16:51:12.911] Looking for peers peercount=2 tried=180 static=0
INFO [11-16]16:51:18.886] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=9.750ms mgasps=0.000 number=53 hash=c042df..045e14 dirty=18.50KiB
INFO [11-16]16:51:19.837] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=16.112ms mgasps=0.000 number=54 hash=8a6d7b..707fe7 dirty=18.98KiB
INFO [11-16]16:51:20.708] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=8.815ms mgasps=0.000 number=55 hash=849687..90f02a dirty=19.45KiB
INFO [11-16]16:51:22.911] Looking for peers peercount=2 tried=156 static=0
INFO [11-16]16:51:28.907] Imported new chain segment blocks=1 txs=0 mgas=0.000 elapsed=7.892ms mgasps=0.000 number=56 hash=2a3154..a3b697 dirty=19.92KiB
```

Ils peuvent désormais commencer le minage.

Envoyer une transaction à Cédric sur son wallet

```
INFO [11-17]10:48:34.942] Submitted transaction hash=0x3edfa83062880e4a5d546fa6136ebfb4aff1a320cd65dc92b6f1769c7b265c53 from=0xfA5a8b5860c5D458b7C8b4f483D714994efff39c nu
npe=0 recipient=0xc18998Ea8e1d0309dAc24d4f1B4243Fb6470eB036 value=25000
"0x3edfa83062880e4a5d546fa6136ebfb4aff1a320cd65dc92b6f1769c7b265c53"
> INFO [11-17]10:48:35.772] Looking for peers peercount=2 tried=107 static=0
INFO [11-17]10:48:37.273] Successfully sealed new block number=243 sealhash=lcc3bl..730fbc hash=29ebcd..64356f elapsed=2.770s
INFO [11-17]10:48:37.273] block reached canonical chain number=236 hash=fdd8ad..d64c24
INFO [11-17]10:48:37.273] mined potential block number=243 hash=29ebcd..64356f
INFO [11-17]10:48:37.274] Commit new sealing work number=244 sealhash=9a629d..a44625 uncles=0 txs=0 gas=0 fees=0 elapsed="209.935µs"
INFO [11-17]10:48:37.275] Commit new sealing work number=244 sealhash=3b884f..bb90c7 uncles=0 txs=1 gas=21000 fees=2.1e-05 elapsed=1.485ms
> eth.pendingTransactions
[[
  {
    blockHash: null,
    blockNumber: null,
    chainId: "0x135dc",
    from: "0xfA5a8b5860c5D458b7C8b4f483D714994efff39c",
    gas: 21000,
    gasPrice: 1000000000,
    hash: "0x3edfa83062880e4a5d546fa6136ebfb4aff1a320cd65dc92b6f1769c7b265c53",
    input: "0x",
    nonce: 0,
    r: "0xb04cb1a364ec1a3bd350d4961e67805a1bea286f3043db625c08b530643dd81",
    s: "0xe59b6bfff90f708aaa771dc21a454991fd2e5d6c74a641a21c57f94586cb52c",
    to: "0xc18998Ea8e1d0309dAc24d4f1B4243Fb6470eB036",
    transactionIndex: null,
    type: "0x0",
    v: "0x62bdc",
    value: 25000
  }
]]
> WARN [11-17]10:48:44.540] Snapshot extension registration failed peer=e0963484 err="peer connected on snap without compatible eth support"
> eth.pendingTransactionsINFO [11-17]10:48:45.311] Successfully sealed new block number=244 sealhash=3b884f..bb90c7 hash=795049..6060f2 elapsed=8.036s
INFO [11-17]10:48:45.312] block reached canonical chain number=237 hash=2b1a1f..347127
INFO [11-17]10:48:45.312] mined potential block number=244 hash=795049..6060f2
INFO [11-17]10:48:45.313] Commit new sealing work number=245 sealhash=28380c..e74e77 uncles=0 txs=0 gas=0 fees=0 elapsed="225.902µs"
INFO [11-17]10:48:45.313] Commit new sealing work number=245 sealhash=28380c..e74e77 uncles=0 txs=0 gas=0 fees=0 elapsed="596.305µs"
INFO [11-17]10:48:45.855] Looking for peers peercount=4 tried=149 static=0
[]
```